ODS specialist in Samplers & Analytical Systems

brochure

On-line low-level TC/TOC analyser Model Quick-TOC-purity for return condensate & boiler feed water

TC, TOC and TIC analyser model Quick-TOC-purity

The model Quick-TOC-purity analyser, manufactured by LAR Process Analysers AG Berlin, is a high quality Total Carbon -, Total Organic Carbon – and/or Total Inorganic Carbon-analyser. The Quick-TOC-loop is especially suitable to monitor the contamination of clean water such as steam condensate, return condensate, boiler feed water, make up water, surplus water, tap water en demin-water. This analyser is fast, sensitive, reliable and offers low maintenance.

The Quick-TOC-purity analyser is available as a:

- TC-analyser: which analyses the sum of organics (TC) and (bi)-carbonates (TIC). Over 90 % of the application use the TC-only method. It monitors total organic carbon as well as carbonates (also not wanted in the boiler) and is the most rapid analyser.
- TC-direct: which analyses all Non Purgable Organic Carbons (NPOC)
- TC-differential: which analyses in two steps the total organic carbon (TC) and the Total Inorganic Carbon (TIC) and calculates the Total Organic Carbon.

Model Quick-TOC-purity uses a totally closed loop injection system operating at 0,4 barg preventing any contamination from out the ambient environment. The fixed loop volume and flow controlled carrier gas circuit results in a perfect stability and performance, typically < 2% repeatability and < 1% reproducibility. The detection limit is 0,02 milligram per litre (20 ppb C.) which implements that the analyser can easily be used to monitor alarm levels of < 100 microgram per litre (100 ppb C.)

This Quick-TOC-purity analyser uses the 1200 degree Celsius thermal oxidation technique. Organic hydrocarbons will be oxidised completely resulting in a very fast response time and a recovery (oxidation efficiency) of 100%.

This TOC-analyser is very suitable to be used in industrial environment. The analyse cabinet has two compartments:

- A dry compartment for all electronics, microprocessor boards, power supplies, NDIR-analyser, carrier gas components etc.
- A wet compartment for all parts in contact with the water such as the loop injection system, the thermal oxidation oven, the condensate cooler and pump etc.

Service engineers have full accessibility to all analyser parts.

Features:

Sample flow:
All wetted parts are inert materials such as Teflon and glass. Absorption and memory effects are so reduced to a minimum resulting in a fast cycle time and rapid response time of 3 minutes. This makes the analyser especially suitable for multi stream applications.

Closed loop injection system:
The complete wet sample system is hermetically closed. The advantage is that there is no chance of contamination due to CO_2 and organic hydrocarbons in the air. The analyser performance will not be influenced by a highly polluted ambient air such as is common practice in an industrial area.

Multi Loop Injection system:
De loop is filled with sample and then injected directly into the reaction tube. The loop volume (400 micro litre) is constant resulting in excellent analyser repeatability and reproducibility. The multi loop injection feature is used for low TOC-ranges. Rapidly, the injection loop will be filled and injected into the reaction tube. This results in one big CO_2 injection peak.

Thermal oxidation:
At 1200 degree C. all hydro carbons will be quantitative oxidised to CO_2. The reaction tube itself as well as the content are all made of high quality ceramics. No catalyst is used. The advantage is that all hydrocarbons are oxidised for 100%. Even hard to oxidise components, that could harm a boiler or process installation, will be completely oxidized.

ODS
klöckner & co multi metal distribution
ODS Sampling & Analytical Systems
Phone. : +31180640879 Fax. : +31180640569
odsanalytical@odsbv.nl www.ods-analytical-systems.com

ODS specialist in Samplers & Analytical Systems

On-line low-level TC/TOC analyser Model Quick-TOC-purity for return condensate & boiler feed water

Auto zero:
The injection and oxidation of hydrocarbons will result in a CO2 peak. This CO2 peak is transported via the carrier gas flow to a Non Dispersive Infra Red Carbon Dioxide Analyser (NDIR CO2). This NDIR measures a CO2 peak, the microprocessor reads continuously the NDIR analyser output and then calculates the peak surface (mAsec). In this way the system compensates (eliminated) for all long time effects such as NDIR drift, temperature drift , carrier gas quality etc. The reproducibility of the Quick-TOC-loop is 0 mg/litre C. per year and 0 mg/litre C. per degree Celsius.

Program, menu. software, display:
This low level TOC-analyser uses a high-tech microprocessor with an internal memory. Via a menu next screens can be selected: Information, diagnostics, historical data (also graphical), analyser settings and parameters. A big easy to operate membrane keyboard and a big back light LCD black white graphical display makes it a easy to operate analyser. After a power loss the analyser will perform a self start-up cycle using the most recent parameters.

Diagnostics, errors and fault finding:
The Quick-TOC-loop makes use of several extra sensors that are mounted into the carrier gas circuit. By use of a mass flow controller, the carrier gas is maintained extremely stable and constant. Sample injection into the oven will result in a pressure change and so in a carrier gas flow pulsation. If the sample is not injected, this is measured and alarmed (free programmable function)
The carrier gas at the analyser inlet and the analyser outlet are measured via mass flow sensors. Any carrier gas leak or system plugging will be measured and result in a screen warning message. A relative humidity sensor monitors the carrier gas flowing to the NDIR indicating a failing condensate cooler. The NDIR will be bypassed and an alarm message will be shown on the screen. Furthermore the oven temperature (1200 degree C.) and the condensate cooler temperature (4 degree C.) are monitored. Via the diagnostic menu, the operator can select which diagnostic functions should result in an alarm or only as a screen message.

Calibration / bench mark / grab sample inlet:
The Quick-TOC-loop offers a selectable input for either a wet calibration standard or a grab sample.
Validation or grab sample: Via the mode “single point measurement” this standard or sample is analysed; for example 5 times, CV max 2%, outliers max 1 (menu selectable). Results are shown as all values,. The calculated average TOC / TIC, the outlier correction and the CV.
Calibration. This calibration routine will do a same procedure as the single point measurement validation function but it will afterwards correct the analyser response curve. All calibration data is stored into memory. Via the menu a weekly or daily automatic calibration can be generated. An output contact can be programmed as “analyser of line”.

Options:

Two-stream analyser:
The quick-TOC-loop is available as a 2-stream analyser. The data is, as sample/hold, presented via 2 each 4-20 mA outputs (isolated, active). Totally 4 alarm contacts can be programmed.

Multistream analyser (ODS special):
The TOC-analysers is available as a 3-stream, 4-stream, 5-stream analyser (or even more). The analyser will automatically select stream 1, 2, 3, 4, 5, 1 etc. Extra digital inputs are available for remote control functionality .
Gas validation: It gets more and more complicated, expensive and time consuming to prepare reliable low level standards. Blanc water and standards are not always “ad hoc” available. Via the gas validation routine the Quick-TOC-loop is checked fast via a gas bottle standard such as carbon dioxide in nitrogen (CO2 in N2) or methane in nitrogen (CH4 in N2). This procedure takes only some minutes. The calibration gas is very stable and can be stored during many years.

Utilities: Zero air generator:
Carrier gas such as instrument air needs to be clean of particles, moisture, hydrocarbons and Carbon Dioxide. It is possible to use pressurised air and filtrate it via for example activated charcoal and soda lime. These systems should be refilled monthly. Especially for low ranges, we advise the use of a zero air sypply. These instruments combine catalytically conversion (CxHy ->CO2) and Pressure Swing Adsorption with Molecular Sieve and remove automatically all traces of interfering gasses. These units require very low maintenance (once every 2 or 3 years). Good quality instrument air of at least 4,5 bar is needed (30 normal litre per hour).

ODS
klöckner & co multi metal distribution
ODS Sampling & Analytical Systems
Phone. : +31180640879 Fax. : +31180640569
odsanalytical@odsbv.nl www.ods-analytical-systems.com

ODS specialist in Samplers & Analytical Systems

On-line low-level TC/TOC analyser Model Quick-TOC-purity for return condensate & boiler feed water

UFC 3-240-13FN
25 May 2005

Table 3-11. ASME Feedwater Limits for Industrial Water Tube Boilers

Feedwater Property	0 - 2068 KPa (0 - 300 psig)	2075-3103 KPa (301-450 psig)	3110 - 4137 KPa (451 - 600 psig)	4144 - 5171 KPa (601 - 750 psig)	5178 - 6205 KPa (751 - 900 psig)	6212 - 6895 KPa (901 - 1000 psig)	6902-10,342 KPa (1001 - 1500 psig)	10,348-13,790 KPa (1501 - 2000 psig)
Dissolved oxygen (ppm O_2) before adding chemical oxygen scavenger	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Total iron ppm Fe (as Fe)	≤ 0.1	≤ 0.05	≤ 0.03	≤ 0.025	≤ 0.02	≤ 0.02	≤ 0.01	≤ 0.01
Total copper ppm Cu (as Cu)	≤ 0.05	≤ 0.025	≤ 0.02	≤ 0.02	≤ 0.015	≤ 0.01	≤ 0.001	≤ 0.001
Total Hardness ppm (as $CaCO_3$)	≤ 0.03	≤ 0.03	≤ 0.02	≤ 0.02	≤ 0.1	≤ 0.05	ND	ND
pH at 25 °C (77 °F)	8.3-10.0	8.3-10.0	8.3-10.0	8.3-10.0	8.3-10.0	8.3-9.6	8.3-9.6	8.3-9.6
Chemicals for pre-boiler system	NS	NS	NS	NS	NS	VAM	VAM	VAM
Non-volatile TOC ppm (as O_2)	< 1	< 1	< 0.5	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2
Oily matter ppm	< 1	< 1	< 0.5	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2

NOTES:
1. Makeup water percentage: Up to 100% of feedwater.
2. Assumes existence of deaerator.
3. Conditions: Includes superheater, turbine drives, or process restriction on steam purity.
4. Saturated steam purity target as shown.
5. NS = not specified.
6. ND = not detectable.
7. VAM = Use only volatile alkaline materials upstream of a temporary water source.

VGB/VdTÜV, All Pressure Levels

Table 8.1.1
VGB Table 1

Parameter		Normal Operating Limit	Remarks
pH (25 °C)	-	9-10	1)
Cation Conductivity (25 °C)	µS/cm	< 0.2	2)
Iron (Fe)	mg/l	< 0.02	
Copper (Cu)	mg/l	< 0.003	
Silica (SiO_2)	mg/l	< 0.02	
Sodium (Na)	mg/l	< 0.01	
Oxygen (O_2)	mg/l	< 0.10	3)
Total Organic Carbon (TOC)	mg/l	< 0.2	4)

Remarks

1) The pH in feedwater shall be achieved by dosing volatile alkalizing agents (Ammonia, NH_3),since feedwater will be used as desuperheater spray water. See also General Remark 3.
2) Continuous Measurement
3) When the cation conductivity of the feedwater is > 0.2 µS/cm for several days, oxygen concentration shall be < 0.02 mg/l
4) TOC shall be as low as practically possible.

EPRI, All Pressure Levels

Note:

In case the flow for the IP and/or HP system originates directly from the LP drum, table 4.1.2 is not valid. In stead reference is made to paragraph 5.2.

Table 4.1.2
EPRI figure 3.1

Parameter		Normal Operating Limit	Remarks
pH (25 °C)	-	9.2 - 9.6	1), 4)
Cation Conductivity (25 °C)	µS/cm	< 0.2	2)
Silica (SiO_2)	ppb	< 10	5)
Sodium (Na)	ppb	< 5	
Oxygen (O_2)	ppb	< 10	6)
Iron (Fe)	ppb	< 5	
Total Organic Carbon (TOC)	ppb	< 200	3)

Remarks

1) The pH in feedwater shall be by volatile alkalizing agents (Ammonia, NH_3), since feed water will be used as desuperheater spray water (see also General Remark 3).
2) Continuous Measurement
3) TOC shall be as low as practically possible.
4) NEM recommends a pH range of 9 - 10.
5) For HRSG's without reheat SiO_2 < 20 ppb is allowed.
6) NEM strongly recommends an oxygen concentration of > 5 ppb and allows an upper limit of 20 ppb.

Table 2
Feed Water Guidelines

Drum Pressure, psig	15-300	301-600	601-900	901-1000	15-1000 (AVT)	1000-1500	>1500
pH, all ferrous heaters	9.3 – 10.0	9.3 – 10.0	9.3 – 10.0	9.3 – 9.6	9.3 – 9.6	9.3 – 9.6	9.3 – 9.6
pH, copper – bearing heaters	8.8 –9.2	8.8 –9.2	8.8 –9.2	8.8 –9.2	8.8 –9.2 (a)	8.8 –9.2	8.8 –9.2
Total hardness, as ppm $CaCO_3$, max	0.3	0.2	0.1	0.05	0.003	ND	ND
Oxygen, ppm max (b)	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Iron, ppm max	0.1	0.03	0.02	0.02	0.01	0.01	0.01
Copper, ppm max	0.05	0.02	0.01	0.01	0.005	0.005	0.002
Organic, ppm TOC max (c)	1	1	0.5	0.2	0.1	0.2	0.2
Cat. Conductivity, µS/cm max	-	-	-	-	0.2	0.5 / 0.2 (d)	0.2 (e)
Hydrazine, ppm	-	-	-	-	0.02	0.02	0.02
Silica, ppm SiO_2 (f)	-	-	-	-	-	0.2	0.1
Oily Matter (mg/l), max	1.0	0.5	0.5	ND	ND	ND	ND

(a) AVT not recommended for copper–bearing cycles and associated low feedwater pH where the drum pressure is less than 400 psig
(b) 0.002 ppm of oxygen should be retained in the boiler feedwater as a minimum.
(c) TOC – Total Organic Compound
(d) Cation conductivity – A phosphate treatment is first number / the second number is for an AVT program
(e) AVT program / phosphate programs not recommended above 1500 psig
(f) Because of its volatility, the feedwater silica concentration cannot significantly exceed the maximum concentration permitted in the steam. When the steam goes to a turbine, this limit is often between 0.020 and 0.010 ppm.
(g) All values represent maximum allowable

ODS Sampling & Analytical Systems installed many on-line process TOC-analyser systems to monitor TOC-contamination of pure water such as condensate return water, boiler feed water, purity water and steam condensate.

Nowadays, the TOC limits, as mentioned in official regulations and guidelines, are very low. An alarm setting of 0,1 or 0,2 mg/ litre C. is common practice.

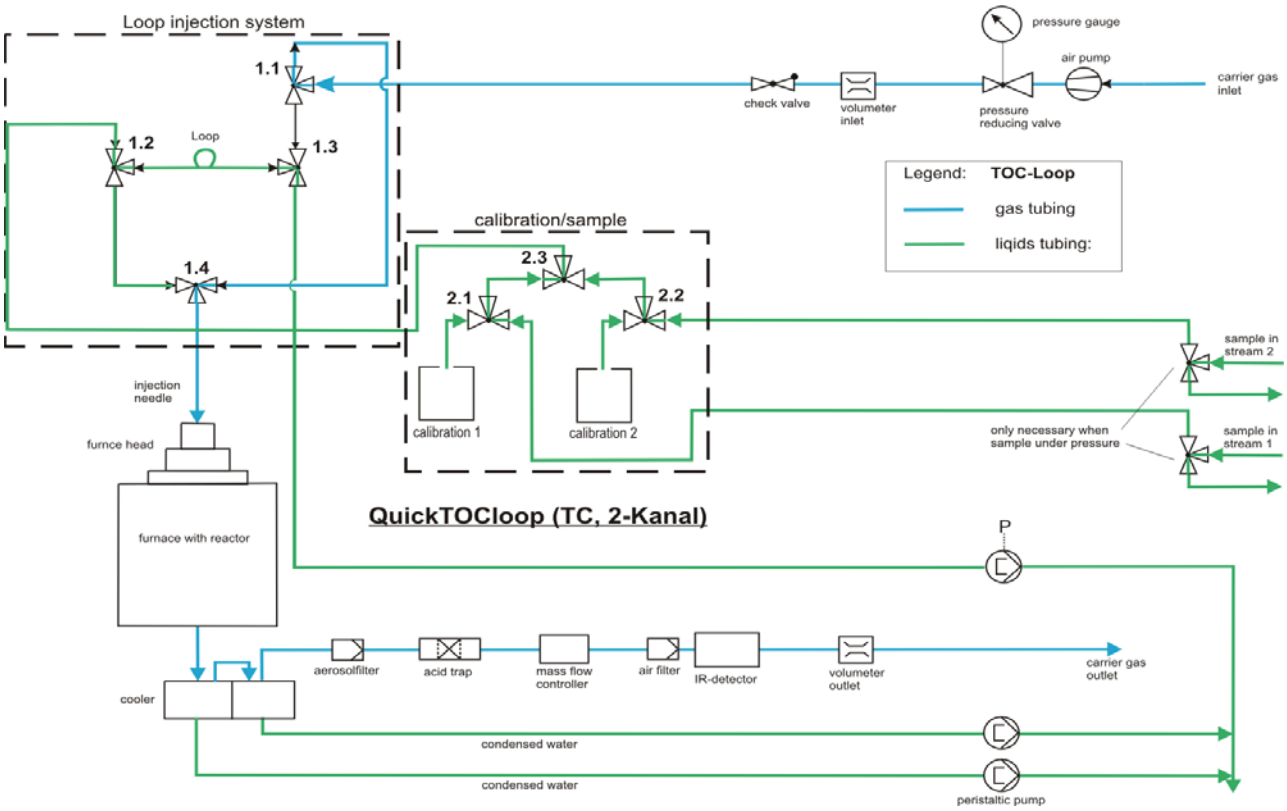
Most TOC-analysers on the market are just not stable enough or suffer with memory problems. ODS has the experience of designing the complete analyser system and selecting the most suitable TOC-analyser to meet all these requirements. We also have the know-how to engineer and install the correct sample extraction-, sample transport and sample conditioning system. In this article we will do some recommendations. It is of great importance to transport the sample from take of point to the analyser in such a way that the sample composition keeps unchanged. Furthermore the total response time of the system should be optimised. Loss of expensive pure and hot water should be minimized.

ODS
klöckner & co multi metal distribution

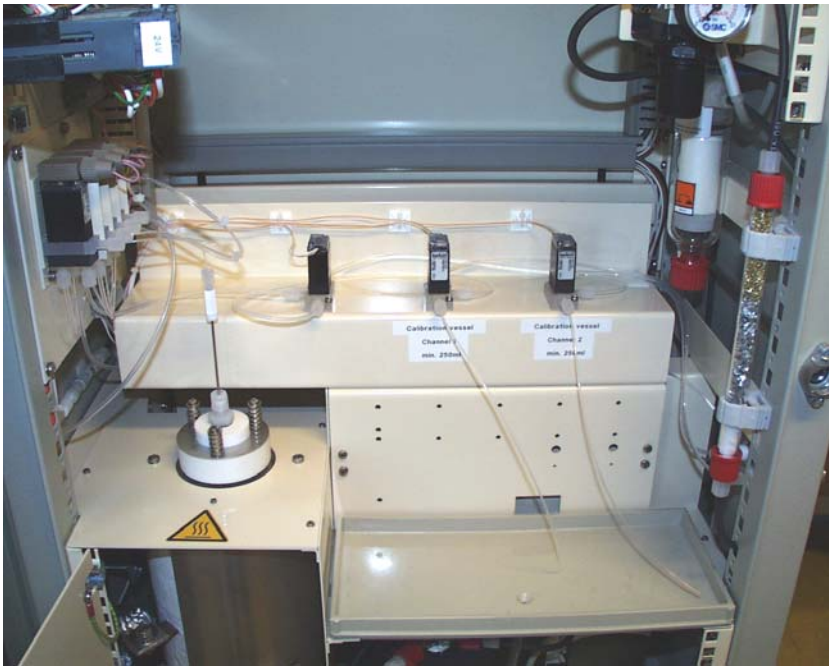
ODS Sampling & Analytical Systems
Phone. : +31180640879 Fax. : +31180640569
odsanalytical@odsbv.nl www.ods-analytical-systems.com

ODS specialist in Samplers & Analytical Systems

On-line low-level TC/TOC analyser Model Quick-TOC-purity for return condensate & boiler feed water



Flow diagram 2-stream TC-analyser



Interior Quick-TOC-purity analyser

ODS Sampling & Analytical Systems
Phone. : +31180640879 Fax. : +31180640569
odsanalytical@odsbv.nl www.ods-analytical-systems.com

ODS specialist in Samplers & Analytical Systems

On-line low-level TC/TOC analyser Model Quick-TOC-purity for return condensate & boiler feed water

Hardware / analyser cabinet

The Quick**purity** is built in a rugged steel/stainless steel cabinet. The analyser is suitable for wall, frame or strut mounting.

It has two separate compartments. Both compartments are easy accessible for maintenance.

The analyser compartment have the following features:

- Dry compartments for the electrical distribution units, power supplies, electronics, e.g. I/O-nodes and CO2-detector;
- Wet compartment for the sample vessels, sample stirrers, injection system, electrical oven with reactor tube, peristaltic pump, peltier cooler etc.

Standard

NEMA4

ATEX Zone 2

ATEX Zone 1

Quickpurity **Cabinet versions**	**Standard cabinet**	**NEMA4X cabinet**	**ATEX Zone 2 Ex p cabinet**	**ATEX Zone 1 Ex p cabinet**
Purpose	Standard industrial area e.g. an analyser shelter, building, factory	Industrial area with risk of corrosive vapours and gasses	Hazardous area with risk of explosive gasses or vapours according ATEX zone 2	Hazardous area with risk of explosive gasses or vapours according ATEX zone 1
IP classification	IP54	IP64	IP64	IP64
Hazardous area according	-	-	Ex II 3 G Ex pz II T3	Ex II 2 G Ex px II T3
Ambient air temperature • recommended • Minimum / maximum	 • 5 to 30ºC • 0 to 38ºC	 • 5 to 25ºC • 0 to 30ºC	 • 5 to 25ºC • 0 to 30ºC	 • 5 to 25ºC • 0 to 30ºC
Ambient air humidity	Max. 95% (non condensing)	Max. 95% (non condensing)	Max. 95% (non condensing)	Max. 95% (non condensing)
Cooling / heat transfer	by ambient air and a fan	Integrated advanced air-air heat exchanger	Integrated advanced air-air heat exchanger	Integrated advanced air-air heat exchanger
Material of the cabinet	Steel, coated grey, hinges/ left side, window Securit	Stainless Steel 316; brushed, coated / transparent hinges / left side, window Securit	Stainless Steel 316, brushed, coated / transparent hinges / left side, window Securit	Stainless Steel 316, brushed, coated / transparent hinges / left side, window Securit
Dimensions: (hxwxd) Excl. glands, connectors etc	1060x595x530 mm *Request for a detailed drawing*	1060x815x570 mm *Request for a detailed drawing*	1060x912x570 mm *Request for a detailed drawing*	1060x915x570 mm *Request for a detailed drawing*
Weight (1-stream)	105 kg	120 kg	120 kg	120 kg
OPTIONS				
High temperature version Ambient air 5 to 50ºC	-	via an integrated compressor cooler	-	-
Zero Air Supply • Passive by cartridges • Active by PSA	Passive or Active • Yes • Yes, recommended	 • Yes • Yes, recommended	 • Yes, recommended • Special via Ex d	 • Yes, recommended • Option: Special via Ex d

ODS Sampling & Analytical Systems
Phone. : +31180640879 Fax. : +31180640569
odsanalytical@odsbv.nl www.ods-analytical-systems.com

ODS specialist in Samplers & Analytical Systems

On-line low-level TC/TOC analyser Model Quick-TOC-purity for return condensate & boiler feed water

Co generator

Commissioning and start up

Sample conditioning systems in a boiler house

Return Condensate Pump

Validation gas inlet

Validation gas; CO2 or CH4

Calibration standard or Grab Sample inlet; 3-stream analyser

ODS service engineer on-site

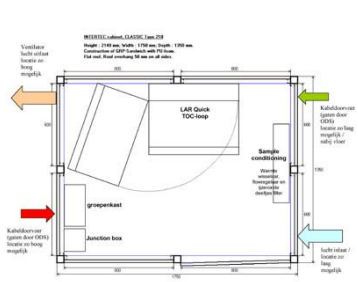
Air conditioning system

ODS sample conditioning with heat exchanger to air

Gebruik temperatuurbestendige handschoenen
Na het sluiten van de kraan het systeem drukloos maken vóór het openen van het filter
De kraan alleen openen als het filterhuis gesloten is

Primary particle filter

Analyser walk in shelter



Top view analyser walk in shelter

ODS analyser shelter for a return condensate project

Deaerator

Sample conditioning panel with water cooler

ODS
klöckner & co multi metal distribution

ODS Sampling & Analytical Systems
Phone. : +31180640879 Fax. : +31180640569
odsanalytical@odsbv.nl www.ods-analytical-systems.com

ODS specialist in Samplers & Analytical Systems

On-line low-level TC/TOC analyser Model Quick-TOC-purity for return condensate & boiler feed water

TOC/TC analyser model Quick-TOC-purity series; Specifications	
Supplier	ODS Instrumentation, Barendrecht
Type	Model Quick-TOC-purity series
Make / manufacturer	LAR Process Analysers AG, Germany, Berlin.
Use	Stationary on-line
Applications	Tap water, steam condensate, boiler feed water, return condensate, demin water etc..
Analysing method Conform to DIN EN 1484, ISO 8254 and EPA 415.1	
Method description: Total Carbon (TC)	Determination of total carbon content by non-catalytical thermal combustion at 1200 °C., and analyses of resulting carbon dioxide.
Option: Total Organic Carbon (TOC)	• TOC-direct: Determination of non purgeble organic carbon content (NPOC) by non-catalytical thermal combustion at 1200 °C., and analyses of resulting carbon dioxide. Prior to analyses, inorganic carbon is removed via acidification and stripping of the sample. • TOC-differential: An analysis method in two steps. Step 1: TC: Determination of total carbon content by non catalytical thermal combustion at 1200 °C., and analysis of resulting carbon dioxide. Step 2: TIC: Determination Total Inorganic Carbon by injecting the sample into a TOC-reactor with acid. Via purging with carrier gas the CO2, coming from the TOC, is transported to the NDIR and measured. TOC is calculated via TOC=TC-TIC.
specifications	
Measuring range (milligram/litre C. or ppm)	1 or 2 or 5 or 10 or 20 or 50 or 100 (and any other range; to be specified) / free programming within limitations via multi loop injection Multi range option with 2 different NDIR's is available
Accuracy (% deviation of reading)/ (in 20 - 100 % of full scale): • Repeatability • Reproducibility	 • <2% • <1%
Sensitivity (mg/litre)	+/- 0,02 or 0,5% scale (highest value)
Zero drift (mg/litre C. per year)	0; auto zero per analyses
Minimum cycle time (minutes): • TC of TOC	 • TC: 3 minutes, TOC: 5,5 minutes (depending on range, type of components/absorption effects, times of loop injections)
Type detector	Non Dispersive Infra Red CO_2 analyser (NDIR) / maintenance free, solid state with no moving parts
Sample delivery: • Pressure (bar) • Flow; to the sample inlet (ml/min.) • Temperature maximum (°C.) • Particles	 • Atmospheric or over pressure (0,05 to 0,2) / self suction system • 50 to 500; for continuous flow an overflow cup is recommended. • 60 (option 80) • Filtration is recommended to avoid fouling of wetted parts, absorption and carry over effects and freak peaks.
Injection method and volume	Multi loop injection via a fixed loop volume and the use of 4 block and bleed valves. Overpressure system of 0,4 bar avoids any contamination from the ambient. Typical 400 micro litre per loop injection, 1 up to max 10 times per analyses.
Cabinet: • Type • Material; • Dimensions; outside; h x w x d (mm) • IP class • Area	 • Wall mounted cabinet, surface treated steel, coated. Wet compartment and dry compartment • 1020 x 700 x 520 • IP 54 (inside use or in an analyser shelter) • Safe area (optional ATEX Ex p Zone 1 or 2)
Weight, (kg):	• 115
Climate conditions: • Temperature; Min. & Max. (°C.) • Relative Humidity	 • 0 tot +35 • Max. 95% RH, non condensing / non corrosive
Power; • Voltage / frequency (V, Hz) • Recommended fuse rating (A) • Power dissipation; maximum (VA/ Watt)	 • 230 / 50; option 115 / 60 • 16 • ca. 1100 during start up, typical 800 average during operation

ODS Sampling & Analytical Systems
Phone. : +31180640879 Fax. : +31180640569
odsanalytical@odsbv.nl www.ods-analytical-systems.com

ODS specialist in Samplers & Analytical Systems

On-line low-level TC/TOC analyser Model Quick-TOC-purity for return condensate & boiler feed water

Carrier gas: • Pressure (barg) • Consumption /flow (normal litres minute) • Quality	 • > 1,5 bar < 5 bar • TC: 20 normal litres per minute / TOC: 40 normal litres per minute • Free of oil, hydrocarbons, water vapour, carbon dioxide
Connections: • Drain, • Carrier gas • Exhaust carrier gas • Sample inlet (TOC or TC)	 • Typical 1 or 2 PVC tubes 8 mm , slope down • 6 mm; bulkhead connector; PVDF or Nylon • 2 each; 6 mm; bulkhead connector; PVDF or Nylon • 6 mm via gland or 6 mm; bulkhead connector; PVDF or Nylon
Calibration / standard / Bench Mark	Internal connection to a standard bottle (part of delivery). Recommended once per month with a fresh standard.
Reagents (only TOC!) • Consumption (litres per week) / Concentration / Type	 • 2; 1 Normal; acidic acid/phosphoric acid (TOC-direct or TOC-diff.)
Certification	CE
Cable entries	Via glands top of cabinet.
Display	Graphical, LCD, high resolution, back-lit; 230 x 100 mm
Control	Auto start function Menu driven with help screens
Data memory	Internal flash card; data storage of 1 month of measuring data
Signals: • Analogue output (mA) • Digital output • Relays outputs • Remote Control	 • 2 each 4-20 mA, active, isolated, 500 ohm max • RS232; string info available / no software included • 4 each; contacts, 30VDC 1 A, free programmable / fail safe • 2 each, zero or 12 to 24 volt DC opto, remote start of analyses
Materials wetted parts (in contact with the sample):	• Glass, teflon
Mounting: • Wall	 • Flat horizontal surface like concrete or a frame; • Delivery includes mounting materials; 4 x screws M8
Guaranty period (year)	1; excluding all consumables and weir parts
Documentation / manual:	• Standard manual in the UK language includes flow schematics, mounting dimensions and constructions, electrical connections etc. • Service manual with exploded views and spare part listing is available on request
Recommended Maintenance frequency: • Validation / Calibration • Acid solution 5 litre • Pump tubes of peristaltic pump; condensate / sample • Scrubbers / ceramic material of oven	(application dependable) • 1x per month • 1x per 4 to 6 weeks / only for TOC-analysers • 4 times a year: 2 tubes / 1 tube • 1 per 1 or 2 years
Analyser options	
Analyser options • 2-stream or multi stream; more then one sample stream • Cabinets; special • Gas validation	 • Multi mA signal outputs, software extension, consult ODS • SS for corrosive environments or ATEX Ex p zone 1 or 2 • Validation via a stable calibration gas (CO_2 or methane)
System Options	
Sample preparation and transport: • Sample extraction probe • Primary particle filter system • Sample Conditioning Systems • Gas validation set	 • Take off point with retractable sample probe • Mounting plate with on/off valve, manometer, high pressure filter, SS sintered filter element • Reducing and controlling sample pressure and sample temperature • Pressure reducer for gas bottle and rotameter with needle valve.
Utilities: carrier gas • Carrier gas out of ambient air • Carrier gas via Instrument Air supply • Carrier gas via a maintenance free Zero Air Supply unit	 • Canisters with activated charcoal & soda lime, air pump, water trap • Pressure regulator, manometer, canisters with activated charcoal & soda lime • Catalytical Conversion of CxHy and Pressure Swing Absorption on Molecular Sieve

Specifications are subject to change by manufacturer or ODS without notice due to modifications or improvements *revision: 2014-02*

ODS Sampling & Analytical Systems
Phone. : +31180640879 Fax. : +31180640569
odsanalytical@odsbv.nl www.ods-analytical-systems.com